RYPOS TRAP

Active Diesel Particulate Filter

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RYPOS

OUTLINE

- Passive vs. Active
- RYPOS TRAP
  - BEKAERT Filter Media
  - Filter Cartridge Design
  - Filter Housing
  - Electronic Control
  - Flow Control
- Results
- Stage of Development
- Competitive Advantages
- Market Opportunity
- Conclusions

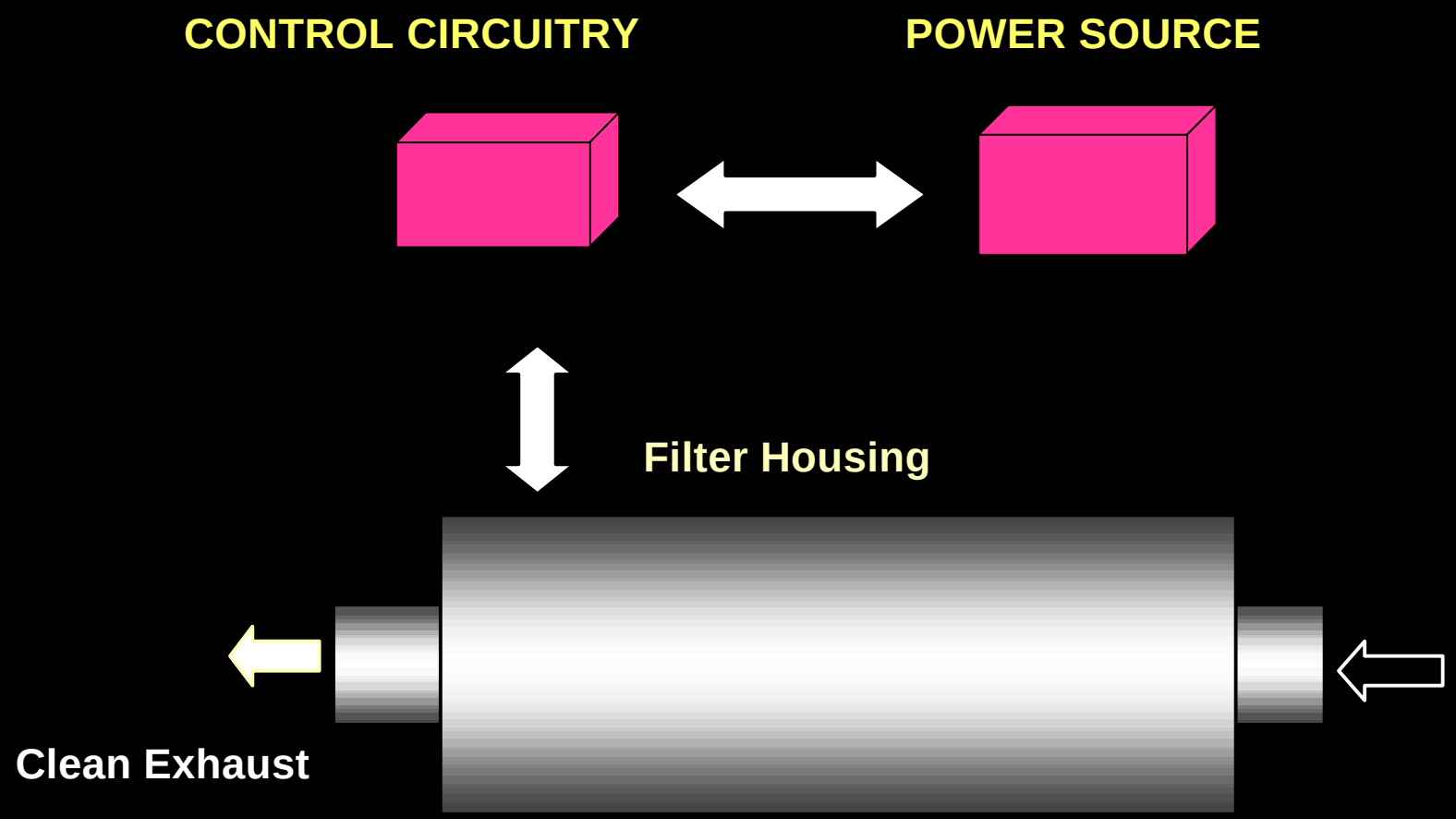
Catalyzed Ceramic Filters: Passive

- Ceramic Cells
- Oxidation Catalyst for Regeneration
- Precious Metals
- Sensitive to Exhaust Temperature
- Uncontrolled Burning/Regeneration
- Catalyst Poisoning

RYPOS TRAP: Active

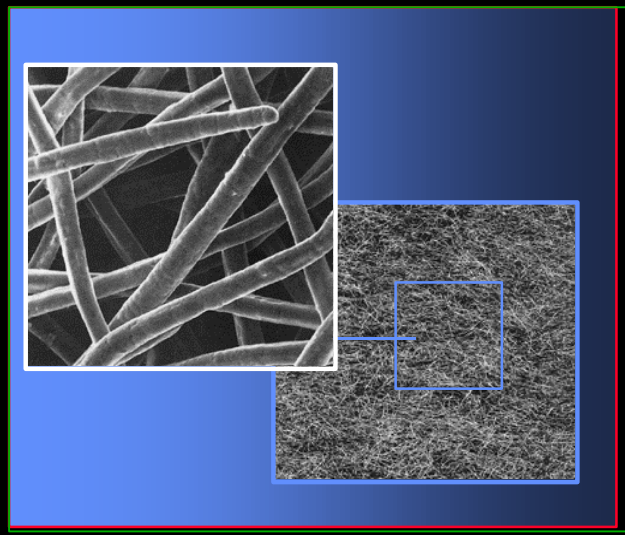
- Utilize The Unique Characteristics of BEKAERT Filter Media
- Direct Electric Heating
- Controlled Regeneration
- Smart (Automatic)
- Energy Efficient

RYPOS TRAP


CONTROL CIRCUITRY
POWER SOURCE
Filter Housing
Clean Exhaust

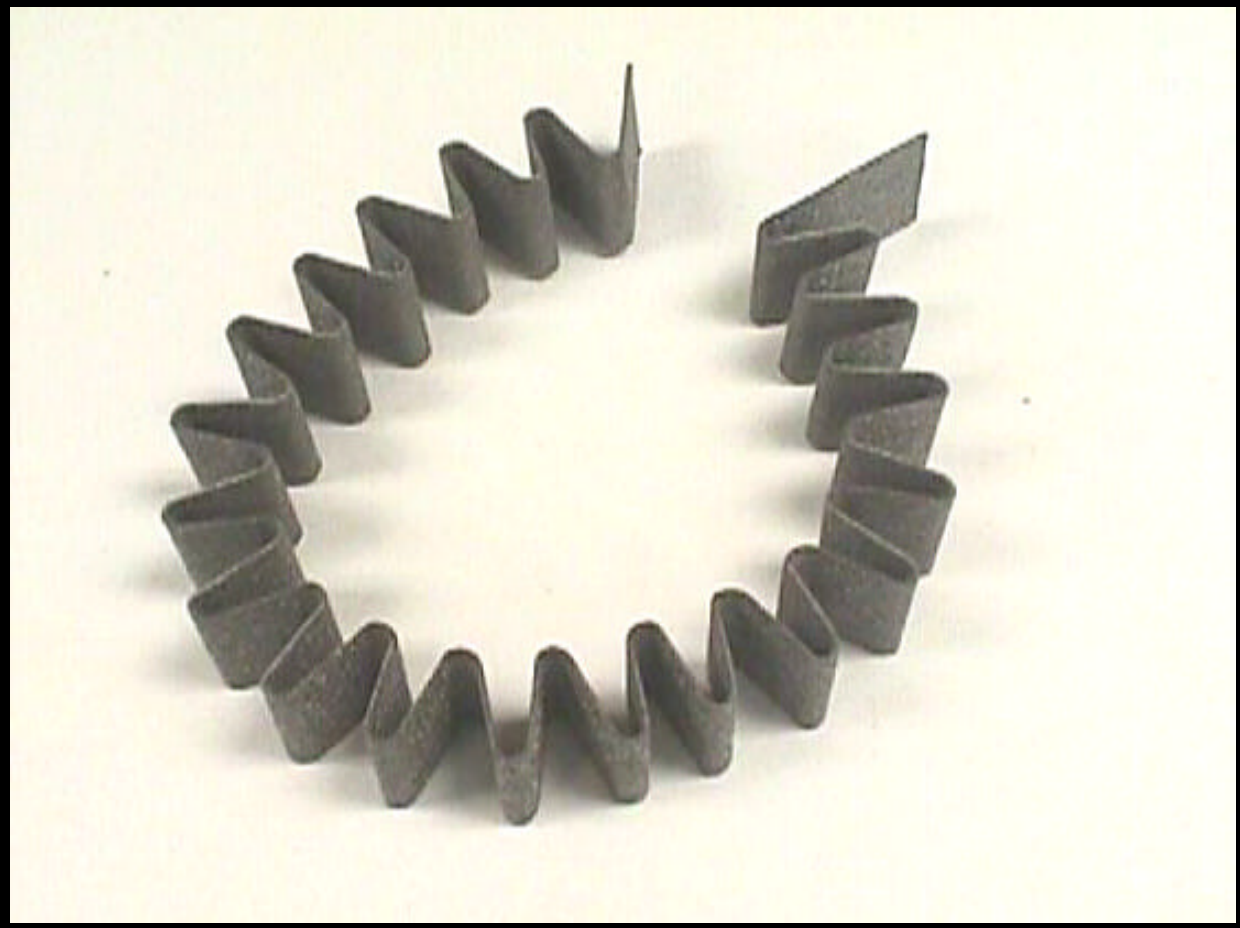
BEKAERT Filter Media

Sintered Metal Fibers

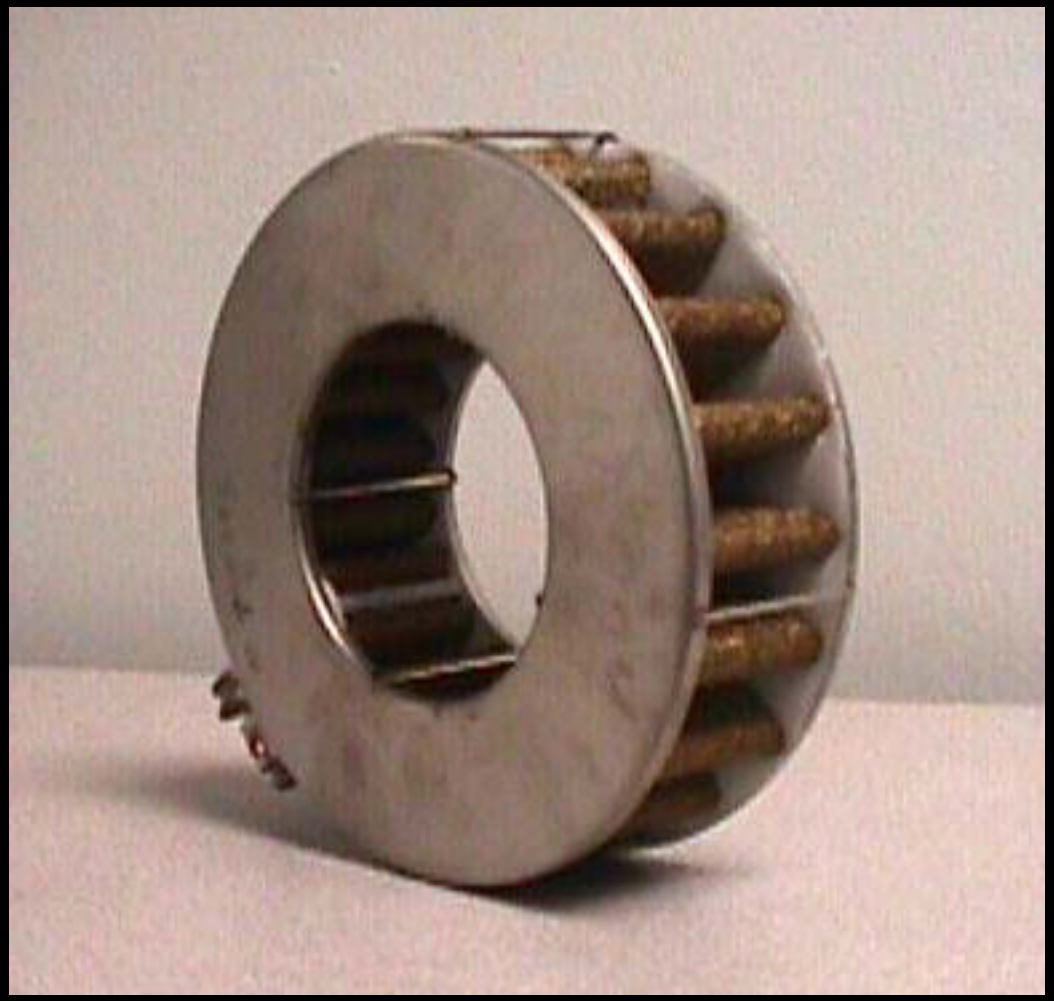


- o Electro-conductive
- o High porosity (85%)
- o Low back pressure
- o Withstands high temperatures
- o Fast Heating (low thermal mass)
- o High filtering efficiency

Pleated Strip



Filter Cartridge

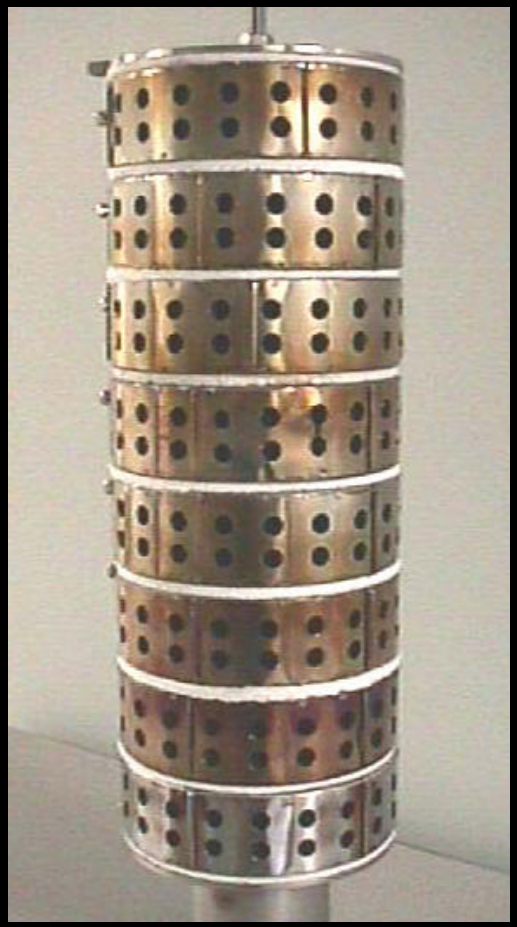


Electrical Regeneration

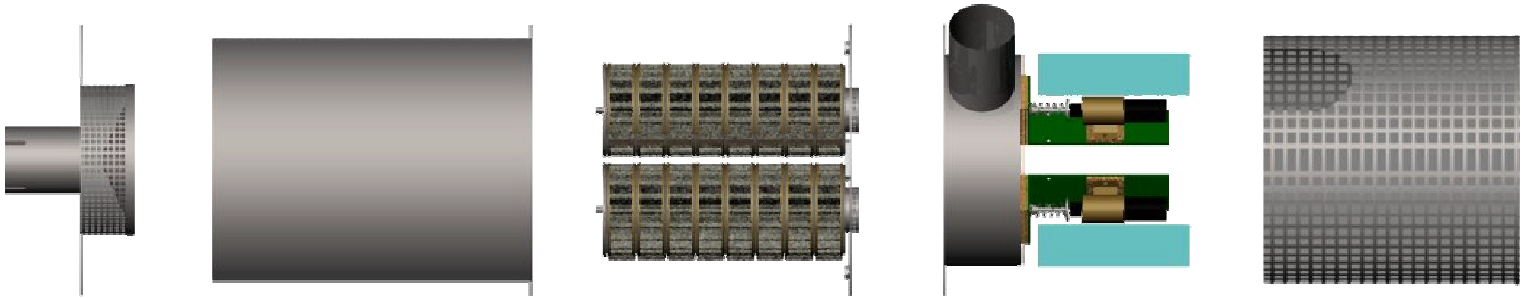
Filter Cartridge With Metal Shield

Efficient Electrical Regeneration

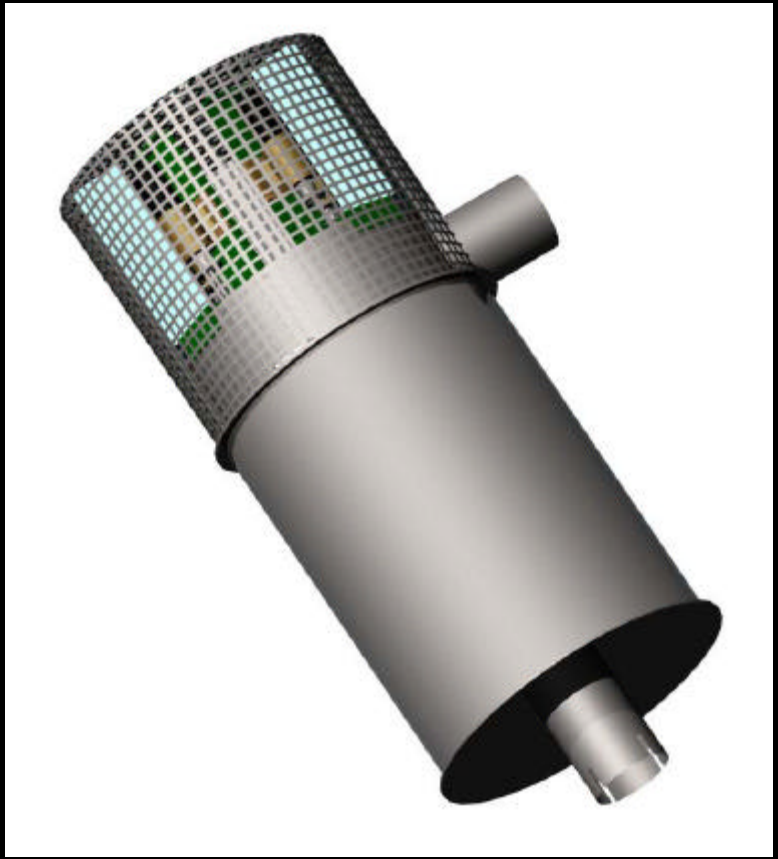
Filter Cartridge Assembly



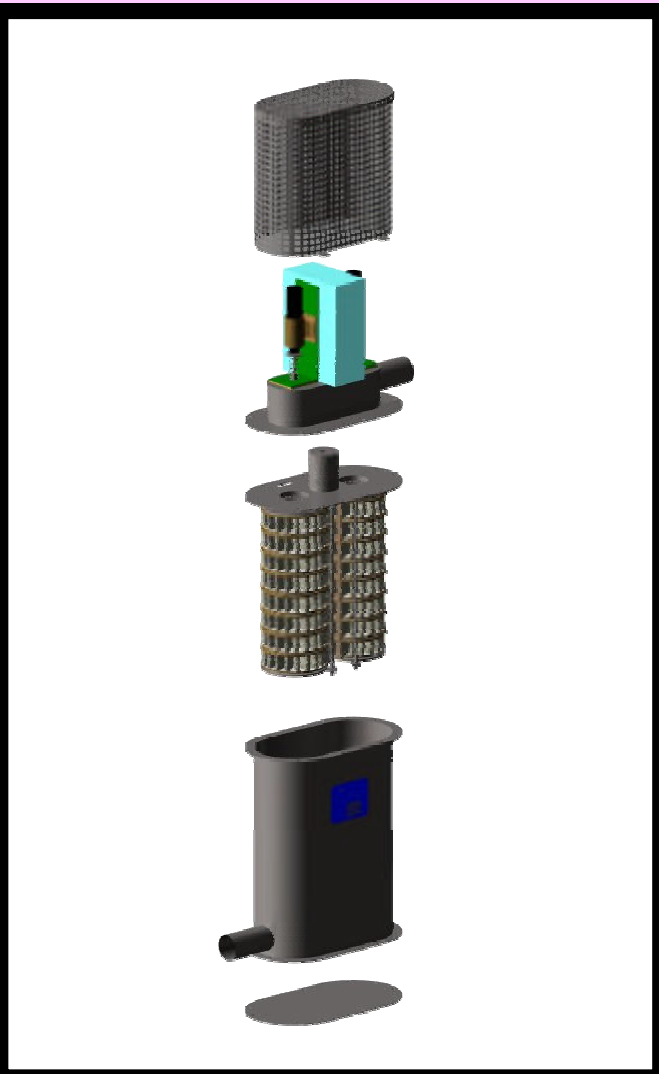
RYPOS TRAP RT408C



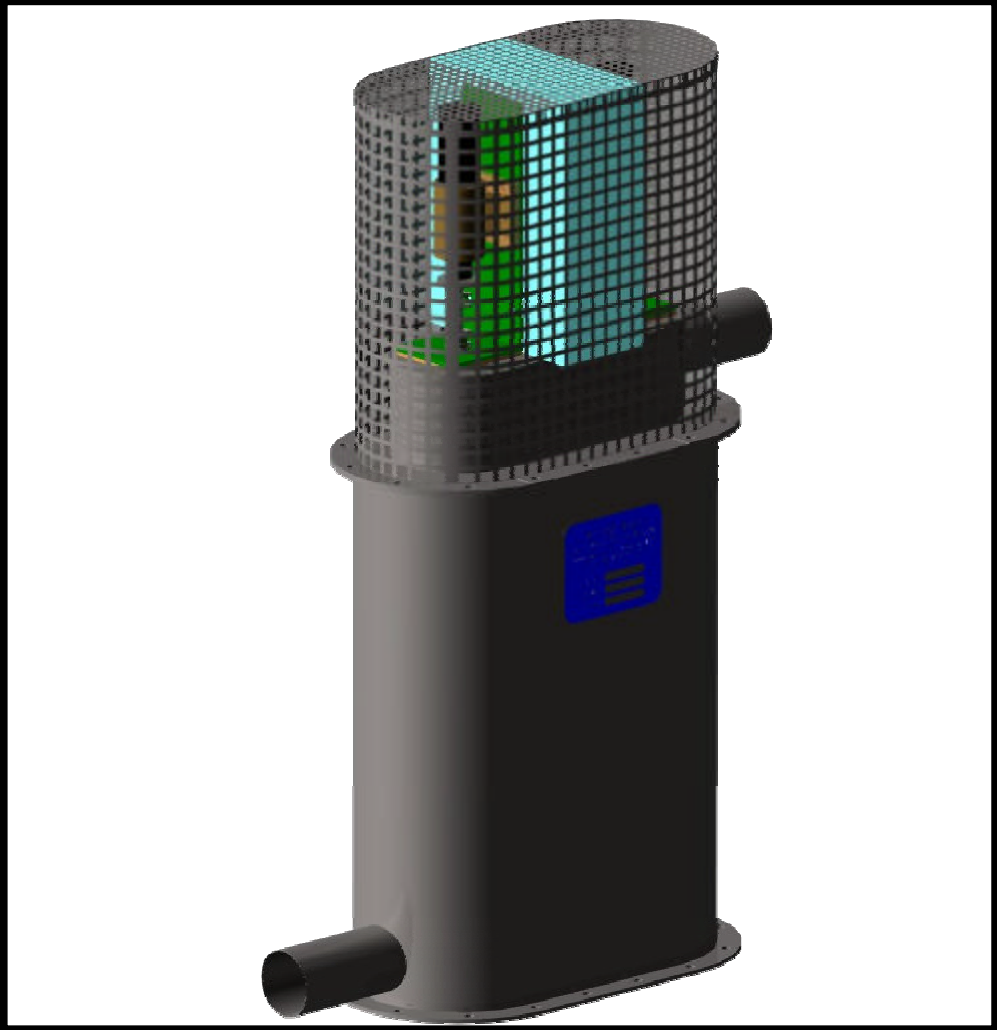
RYPOS TRAP RT408C



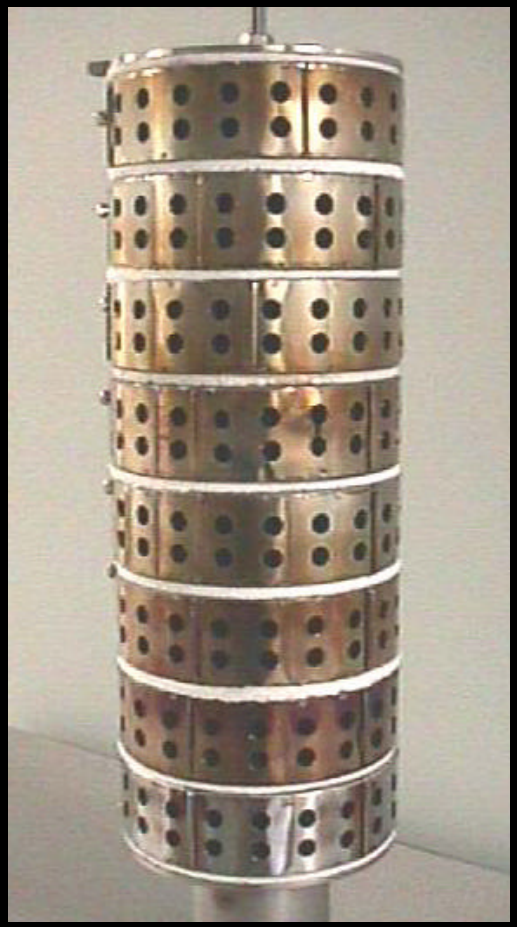
RYPOS TRAP RT208E



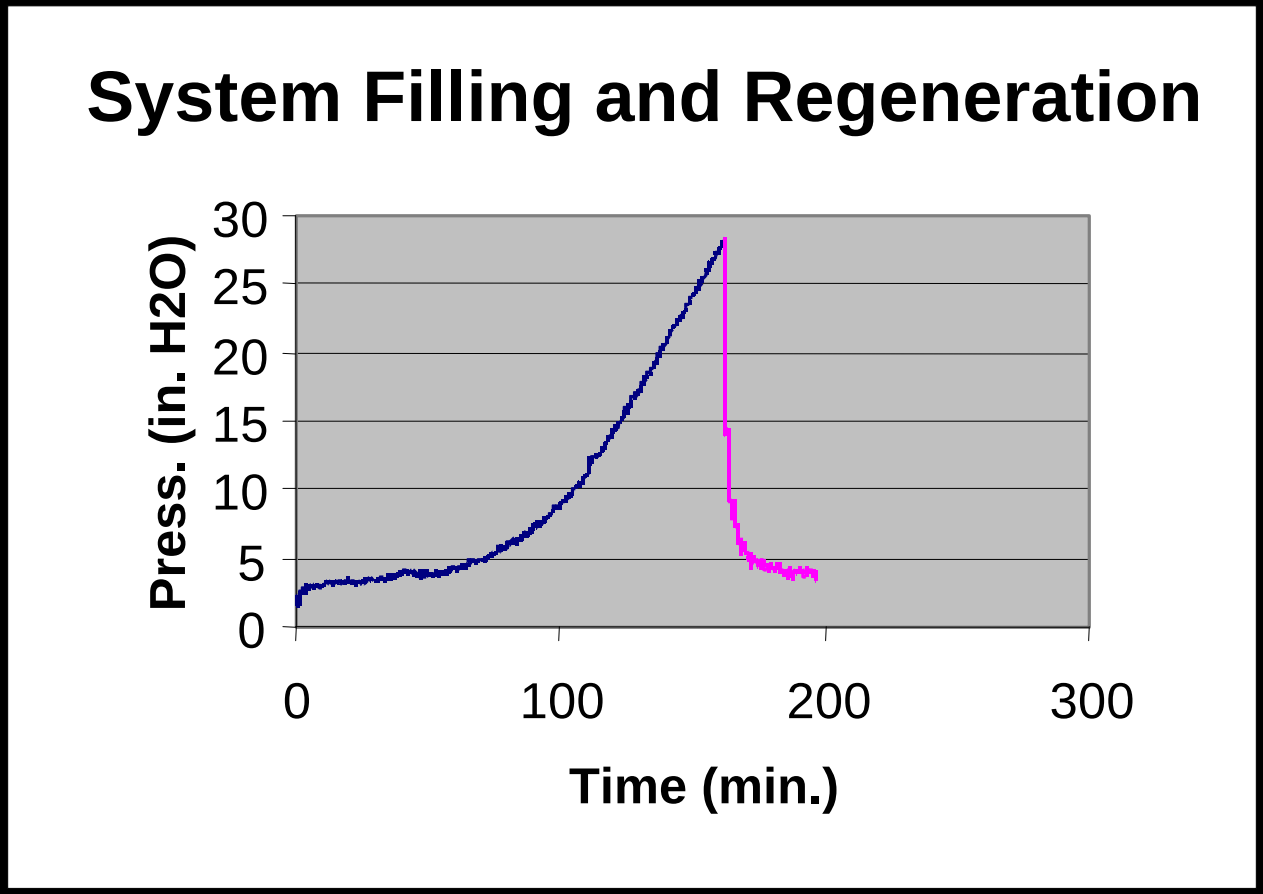
RYPOS TRAP RT208E



Filter Cartridge Assembly



Filling and Regeneration RT408C

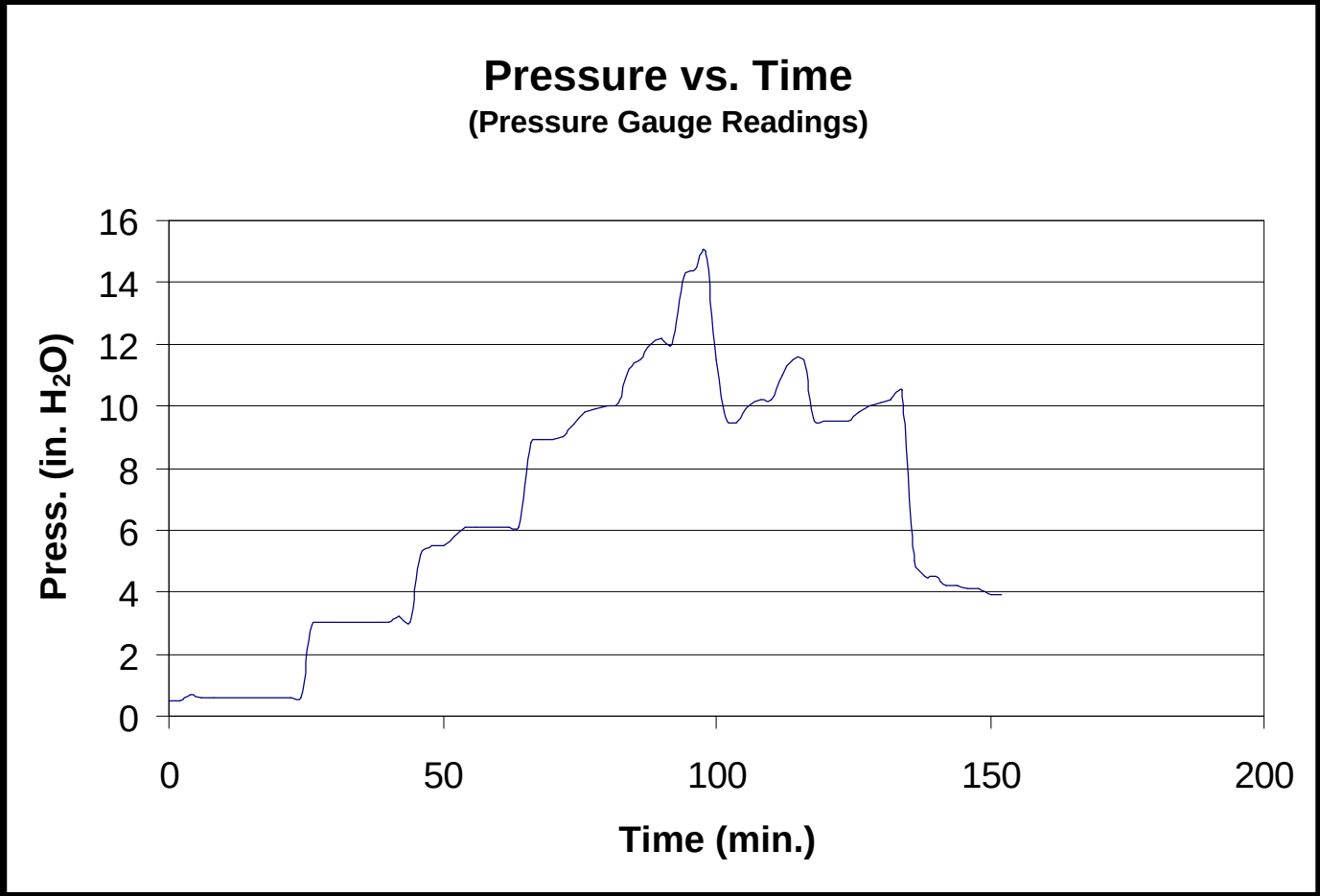


Cummins 5.9 L Turbo, 120 hp @ 1800 rpm

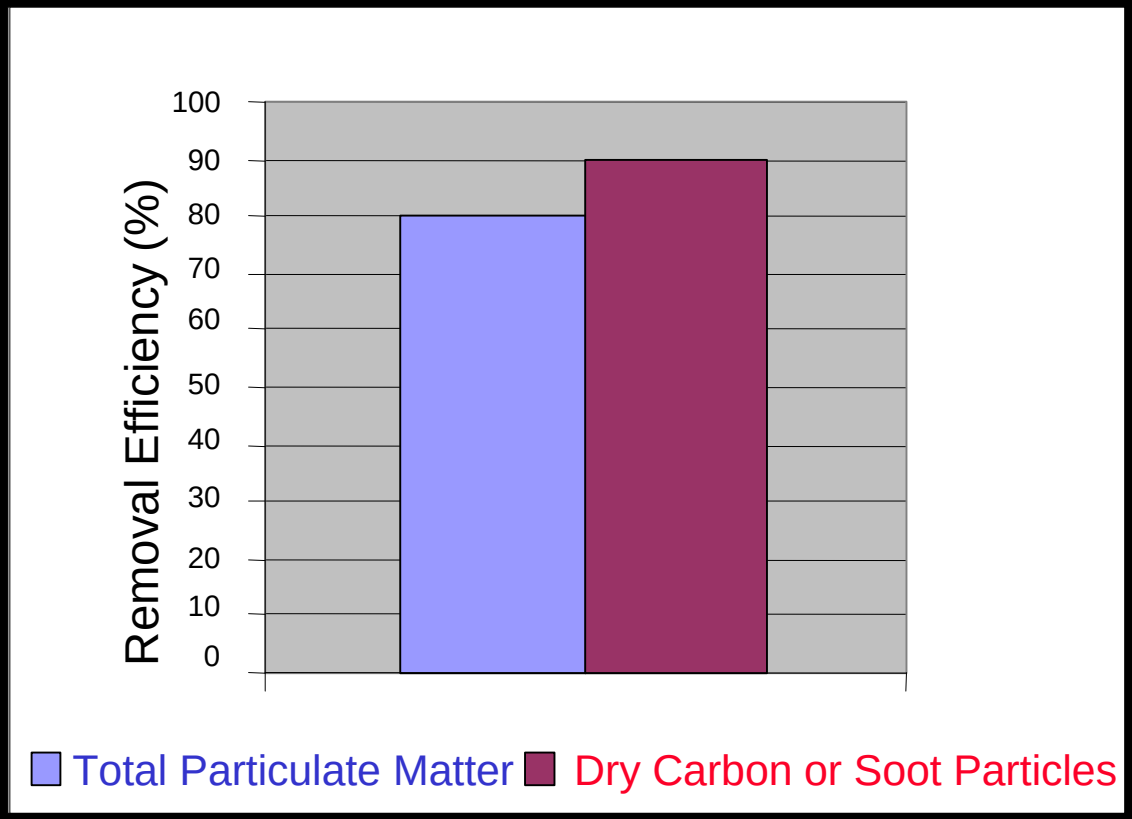
Regeneration Test RT408C

Idle	850 rpm	20 min
40 hp	1600 rpm	20 min
80 hp	1800 rpm	20 min
120 hp	1900 rpm	44 min
80 hp	1800 rpm	20 min
40 hp	1600 rpm	20 min
Idle	840 rpm	20 min

Regeneration Test RT408C



Efficiency Test RT408C



Stage of Development

- Pre-production Prototype (5th Generation)
- Proprietary Control Circuitry
- Novel Filter Design
  - U.S. Patent 6,063,150
  - U.S. Patent 5,853,437
- RYPOS System
  - Patent Application

Competitive Advantages

RYPOS/BEKAERT Metal Fibers	Ceramic/SiC Fibers/Cells
	Passive: Oxidation Catalyst / Fuel additives
Active: Direct Heating Fast/Low Energy Consumption	Active: Indirect Heating Slow/High Energy Consumption
Low Back Pressure (< 40 inches of water)	High Back Pressure (> 60 inches of water)
Not Sensitive to Exhaust Temperature	Sensitive to Exhaust Temperature

Market Opportunity

Market

OEM

Engine Manufacturers

Retrofit

- **Diesel Generators**
- **Urban Buses**
- **Trucks**
- **Off Road Equipment**
- **Marine Diesel Applications**
- **Diesel Locomotives**

Conclusions

- High Performance -traps more than 80% of total PM and 90% of soot
- Energy Efficient - only 750 Watts (1HP) on average for a 200 hp engine
- Fully Automatic - no operator intervention - no downtime
- Rugged - long life (est. 20,000 engine hours)
- Size can be adapted from 50kW to 1000kW Diesel Generators
- Wide Application - any diesel engine, stationary or mobile
- Can be used with or without diesel oxidation catalyst